APPENDIX A

Docket No.: 19036/41350
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Hiroshi Kubota

Application No.: 11/550,318 — Confirmation No.: 1107

Filed: November 17, 2006 — Art Unit: 2832

For: Sound Wave Guide Structure for Speaker System and Horn Speaker — Examiner: E. San Martin

MS Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AFFIDAVIT OF HIROSHI KUBOTA UNDER 37 CFR § 1.132

1. I have a degree in Bachelor of Design Engineering from Kyushu Institute of Design.

2. Since 1984, I have worked for TOA corporation as an engineer, where I have been involved in design, development, and manufacturing of loudspeakers.

3. I have read the Office Action dated August 13, 2009 in the above identified application and I have studied, in detail, each of U.S. Patent No. 7,177,437 ("Adams"), U.S. Patent No. 1,871,243 ("Smythe"), U.S. Patent No. 3,957,134 ("Daniel"), and U.S. Patent Application Serial No. 11/550,318 ("the instant application").

4. I have significant experience in the design and manufacture of sound speakers, such as the speakers shown in Adams, Smythe, Daniel, and the instant application, including more than 20 years in the design, marketing and oversight of operations of manufacturing speakers. With this experience, I am familiar with the design and engineering of speaker

systems. I am familiar with the speaker systems that include multiple sound wave guide paths, such as those shown in Adams, Smythe, Daniel, and the instant application.

5. I have conducted computer based experiments on the speaker structure as shown in Adams. In particular, I have run boundary element analyses on computer models of the speaker structure as shown in Adams. More particularly, I have modeled the straight sound wave guide path speaker system as shown in Adams. The computer based testing was carried out for sound frequencies of 8000 Hz. Such frequencies are generally considered high frequency.

6. The results of these computer based tests are shown graphically in Figs. 1A and B attached below. Each figure illustrates the phase of sound wave of 8000 Hz in paths of the straight sound wave guide path speaker system. The results shown in Figs. 1A and B show that the straight guide path speaker structure taught by Adams results in a non-coherent sound wave at the device exit. In particular, the circled area of Fig. 1A shows that the sound wave exiting the Adams device is not coherent in that the phases differ between path exits. This phase difference is more easily observed in the color graph of Fig. 1B. The colors of sound wave proximate the respective path exits are irregular or uneven, which shows the phases of sound wave exiting the Adams device. In this way, the sound wave does not exit the device in a coherent manner.

7. The sound waves of the Adams device experience refraction within the sound wave paths due at least in part to the sharp relative angles between the branches of the sound wave paths. Additionally, this refraction is at least partly responsible for the non-coherent sound wave at the exit.

8. I have also conducted computer based experiments on the claimed sound wave guide structure. In particular, I have run boundary element analyses on computer models of the claimed sound wave guide structure. More particularly, I have modeled the straight and curved sound wave guide paths of the claimed sound wave guide structure. The computer based testing was carried out for sound frequencies of 8000 Hz.

9. The results of these computer based tests are shown graphically in Figs. 2A and B attached below. Each figure illustrates the phase of sound wave of 8000 Hz in paths of the claimed sound wave guide path speaker system. The results shown in Figs. 2A and B show that the claimed straight and curved sound wave guide structure results in a coherent

sound wave at the exit. In particular, the circled area of Fig. 2A shows that the sound wave exiting the claimed sound wave guide structure is coherent in that the phases are substantially the same between path exits. This phase similarity is more easily observed in the color graph of Fig. 2B. The more or less uniformly yellow color proximate the each path exit represents substantially similar phases at the path exit. As seen in Fig. 2B, the sound wave exits the claimed sound wave guide structure in a coherent manner.

10. The coherent exit of sound waves from the claimed sound wave guide structure is due at least in part to the low angles of incidence between the branches. This low angle of incidence between the branches minimizes or eliminates unwanted sound wave reflection between the branches. The curved nature of some of the branches realizes said low angle of incidence as well as enabling each sound wave path to have a substantially similar path length, which contributes to the sound wave's coherency.

11. The computer modeling results discussed above show the superior performance of the claimed sound wave guide structure when compared to prior art speaker structures, such as the structure shown in Adams.

12. All statements made herein of my own knowledge are true, and all statements made upon information and belief are believed to be true, and further these statements are made with the knowledge that willful false statements and the like, so made are punishable by fine or imprisonment, or both, under section 1001 of title 10 of the United States Code and that such willful false statements may jeopardize the validity of the instant patent application or any patent issuing thereon.

January 7, 2010 HIROSHI KUBOTA

Hiroshi Kubota